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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Barrett E. Cole et al.

Title: DUAL COLOR STUDA

Docket No.: H0002243-0760
Filed: February 22, 2002
Examiner: Douglas A. Wille

Serial No.: 10/081,369
Due Date: July 24, 2005
Group Art Unit: 2814

**MS Appeal Brief**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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X A return postcard.
X A Substitute Appeal Brief (23 Pages).
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Dawn M. Poole
Name

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(GENERAL)

# SUBSTITUTE APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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## SUBSTITUTE APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Substitute Appeal Brief is presented in support of the Appeal Brief filed on March 2, 2005 and the Notice of Appeal to the Board of Patent Appeals and Interferences, filed on December 30, 2004, from the Final Rejection of claims 1-17 and 19-24 of the above-identified application, as set forth in the Final Office Action mailed on December 30, 2004.

The Commissioner of Patents and Trademarks is hereby authorized to charge Deposit Account No. 19-0743 in the amount of $500.00 which represents the requisite fee set forth in 37 C.F.R. § 41.2(b)(2). The Appellants respectfully request consideration and reversal of the Examiner's rejections of pending claims.

## 1. REAL PARTY IN INTEREST

The real party in interest of the above-captioned patent application is the assignee, HONEYWELL INC..

## 2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant that will have a bearing on the Board's decision in the present appeal.

## 3. STATUS OF THE CLAIMS

Claims 1-24 and 42 are pending in the application. Claim 18 is indicated as allowable if amended to incorporate limitations of preceding claims, and claim 42 is allowed. The rejected claims 1-17 and 19-24 are the subject of the present appeal.

## 4. STATUS OF AMENDMENTS

Claims 1, 10, and 24 were amended after the final rejection by an amendment filed on October 29, 2004. The amendment was entered in the advisory action mailed November 23, 2004 as overcoming 35 U.S.C. §112, second paragraph rejections.

## 5. SUMMARY OF THE INVENTION

Two detectors that detect adjacent bandwidths of radiation are used to detect a wider bandwidth than can be detected by a single detector. Independent claim 1 recites an optical sensor 110 in FIG. 1, as described on page 4, starting at line 6 has a bandpass filter 112 that functions to ensure only a limited bandwidth of light is passed through to a detector 114 that is sensitive to the entire spectral range of wavelengths that can be passed through the tunable bandpass filter 112. The detector 114 has a first detector 160 (page 6, line 17-21) responsive to a low wavelength band passed by the bandpass filter, and a second detector 170 (page 6, line 17-21) that is responsive to a high wavelength band passed by the bandpass filter. The low band and high band are adjacent bands of wavelengths (page 2, lines 14-18) such that the combined low band and high band are wider than can be detected by either the first or second detector(page 2, lines 14-18, also, page 2, lines 4-5).

Dependent claims 2-9 describe various structural features, such as the detectors being formed in a stacked relationship, the bandpass filter being adjustable and comprising a Fabry-Perot etalon (page 4, lines 13-14). The detectors are formed of $Al_xGa_{1-x}N$ and $Al_yGa_{1-y}N$ where $y<x$, or are formed of $Al_xGa_{1-x}N$ and InGaN (page 6, lines 17-21). In one embodiment, the first detector absorbs wavelengths of approximately 250 to 300 nanometers and the second detector absorbs wavelengths of approximately 290 to 390 nanometers (page 6, lines 22-25). The optical sensor is formed on a sapphire substrate(page 6, lines 17-21).

Independent claim 10 is similar to claim 1 and in addition describes an in-band source that illuminates a sample proximate the bandpass filter(page 8, lines 17-20). Also, the wavelength bands are adjacent and overlapping (page 6, lines 22-25).

Dependent claims refer to the in-band source is selected from the group consisting of laser, light emitting diode, ultraviolet source, and superluminescent diode (page 8, lines 17-20). Charge detectors 210 and 220 (page 7, lines 7-11) may be coupled to the detectors. In claim 14, the optical sensor has a first substrate 118, a second substrate 120, and a third substrate 122 in which the charge detectors are formed (page 6, lines 3-8). The sample is inorganic, or a

biosample in one embodiment (page 8, lines 15-25).

Independent claim 24 describes an optical sensor similar to that of FIG. 1, where the low and high band overlap and are wider than can be detected by either the first or second detector. Further, the first detector is formed on a sapphire substrate 122 (page 5, lines 23-27).

## 6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-4, and 9 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397).

Claims 5-8 and 12 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397) and further in view of Hier et al. (U.S. Patent No. 6,407,439) and Koslowski et al. (U.S. Patent No. 6,483,116).

Claims 10, 11, 13-17, 19, 23 and 24 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397).

Claims 20-22 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397) and Yokoi (U.S. Patent No. 6,459,484) and further in view of Hier et al. (U.S. Patent No. 6,407,439) and Koslowski et al. (U.S. Patent No. 6,483,116).

## 7. ARGUMENT

### *1) The Applicable Law*

The Examiner has the burden under 35 U.S.C. 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). As part of establishing a *prima facie* case of obviousness, the Examiner must show that some objective teaching in the prior art or some knowledge generally available to one of ordinary skill in the art would lead an individual to combine the relevant teaching of the references. *Id.*
The court in *Fine* stated that:

> Obviousness is tested by "what the combined teaching of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 878 (CCPA 1981)). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *ACS Hosp. Sys.*, 732 F.2d at 1577, 221 USPQ at 933. And "teachings of references can be combined *only* if there is some suggestion or incentive to do so."

*Id.* (emphasis in original).

The M.P.E.P. adopts this line of reasoning, stating that:

> "In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Appellant s disclosure. *In re Vaeck* , 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir. 1991))". *M.P.E.P.* 2142

The test for obviousness under § 103 must take into consideration the invention as a whole; that is, one must consider the particular problem solved by the combination of

elements that define the invention. *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985). The Examiner must, as one of the inquiries pertinent to any obviousness inquiry under 35 U.S.C. § 103, recognize and consider not only the similarities but also the critical differences between the claimed invention and the prior art. *In re Bond*, 910 F.2d 831, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990), *reh'g denied*, 1990 U.S. App. LEXIS 19971 (Fed. Cir. 1990). Finally, the Examiner must avoid hindsight. *Id.*

***2) Discussion of the Rejection of the Claims Under 35 U.S.C. § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397).***

***Claims 1-4, and 9***

Claims 1-4, and 9 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397). This rejection is respectfully traversed, as the references either alone or combined do not show each and every element of the claimed invention. Please note that claim 43 was previously cancelled.

The claims recite that neither the first detector nor the second detector can detect the entire spectrum of radiation passed by the bandpass filter, but that they detect adjacent high and low bands passed by the bandpass filter. The purpose of the claimed structures is to detect the entire bands passed, that a single detector cannot fully detect. Cole et al., implies that the band of radiation passed by the filter is detected by a single detector or array of detectors. Thus, Cole et al., was not faced with the problem of detecting a band of radiation that was wider than could be detected by a single type of detector. It should be noted that Cole et al. includes the same inventor as in the present application, and specifically states in the background section of the present application that "Some detectors have a limited bandwidth of detection that is not as great as the bandwidth desirably passed by the filter. There is a need for an improved detector that can detect a larger bandwidth passed by the filter." Page 2, lines 5-7.

Tokuda et al., is directed at distinguishing between two frequencies, not detecting a

broader spectrum passed by a bandpass filter. The abstract of Tokuda et al., states: "for adjusting a critical wavelength at which the light absorption characteristic of the device dramatically changes." The summary indicates that: "It is an object of the present invention to provide a light responsive semiconductor device which has enhanced wavelength selectivity and produces a bistable output current as a function of the wavelength of incident light." It further provides that "It is a further object of the present invention to provide a light responsive semiconductor device that divides incident light including several monochromatic light signals into independent output signals with very high wavelength selectivity." Col. 2, lines 15-24. FIG 15 shows the desired dramatic changes at different, but close frequencies.

There is no suggestion to combine Cole et la. With Tokuda et al. The Office Action states that "it would have been obvious to use the Tokuda et al., detector in Cole et al., device to improve the wavelength sensitivity. Note that what is passed by the Fabry-Perot is examined." The suggestion "to improve the wavelength sensitivity" is not understood. That is not the purpose of the presently claimed structures, which detect an entire bandwidth passed by a filter. There is no desire in the presently claimed invention to increase wavelength sensitivity as that term may be inferred by Tokuda et al.

Since Cole et al., appears content with a single type of detector, there is no desire in Cole et al., to look for ways to improve the wavelength sensitivity. Tokuda et al., is interested in clearly distinguishing from different frequencies. The abstract of Tokuda et al., states: "for adjusting a critical wavelength at which the light absorption characteristic of the device dramatically changes." The summary indicates that: "It is an object of the present invention to provide a light responsive semiconductor device which has enhanced wavelength selectivity and produces a bistable output current as a function of the wavelength of incident light." As clearly seen, the references are directed toward entirely different problems. There is no desire in Cole et al. to improve wavelength sensitivity. Combining the detectors in Tokuda et al., with the Cole filter would only result in the ability to distinguish between different frequencies, not to detect high and low wavelength bands passed by a bandpass filter as claimed in the present application. Thus, even if combined, the references do not teach or suggest the claimed invention.

Claim 1 recites "wherein the low band and high band are adjacent bands of wavelengths, wherein the combined low band and high band are wider than can be detected by either the first or second detector." The first detector detects the low band, and the second detector detects the high band. Cole et al. does not use two detectors in this manner, and the two detectors of Tokuda et al. do not detect bands, but appear designed for wavelength sensitivity and producing a bistable output at critical wavelengths. The combination clearly does not teach or suggest the claimed ability to detect a combination of adjacent bands as claimed. Rather, Tokuda et al. keys in on one distinct or critical wavelength.

Dependent claims not specifically discussed in this Appeal Brief are believed to depend from allowable claims, and as such, are believed allowable. Reversal of the rejections thereof is respectfully requested.

In the Examiner's Answer, it is stated that a bolometer is virtually wavelength independent. This statement highlights one major difference between the claimed invention and Cole. The claimed invention specifically states that the detectors detect different bands of wavelengths.

The Examiner's Answer also indicates that the purpose of a device is not relevant to the claims. Applicant has described purposes in the context of indicating whether references are combinable, which is indicative of a lack of proper suggestion to combine the references.

The Examiner's Answer also indicates that Applicant has misconstrued Tokuda et al., showing a basic misunderstanding of how a Fabry-Perot filter works. Applicant believes that by directly quoting Tokuda et al., it has not been misconstrued. Applicant was describing the overall functioning of Tokuda et al., not the operation of one component of Tokuda et al. The function of the filter is to pass selected frequencies. It does not matter exactly how it passes the frequencies. The Examiner also makes reference to an appendix describing how a Fabry-Perot filter works. The appendix is empty. Thus, Applicant has not been given the chance to respond fully to this new evidence. Further, the exact functioning of a Fabry-Perot filter is almost irrelevant to claim1. Claim 1 describes a bandpass filter. How the frequencies are passed is not a concern in claim 1.

***3) Discussion of the Rejection of the Claims Under 35 U.S.C. § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397) and further in view of Hier et al. (U.S. Patent No. 6,407,439) and Koslowski et al. (U.S. Patent No. 6,483,116).***

**Claims 5-8 and 12**

Claims 5-8 and 12 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397) and further in view of Hier et al. (U.S. Patent No. 6,407,439) and Koslowski et al. (U.S. Patent No. 6,483,116). This rejection is respectfully traversed.

Claim 5 recites that the detectors are respectively formed of $Al_xGa_{1-x}N$ and $Al_yGa_{1-y}N$ where $y<x$. In addition to not disclosing the structure of independent claim 1, from which claim 5 depends, the references do not teach or suggest the claimed relationships between fractions of each element. A prima facie case of obviousness has not been established, and the rejection should be reversed.

Claim 6 recites that the detectors are respectively formed of $Al_xGa_{1-x}N$ and InGaN. In addition to not disclosing the structure of independent claim 1, from which claim 6 depends, the references do not teach or suggest the claimed formations of the respective detectors combined to detect the full bandwidth passed by the filter. A prima facie case of obviousness has not been established, and the rejection should be overturned.

Claim 7 recites that the first detector absorbs wavelengths of approximately 250 to 300 nanometers. This range is not seen in the Kozlowski et al reference cited. A prima facie case of obviousness has not been established, and the rejection should be overturned.

Claim 8, in addition to distinguishing the references based on using separate detectors to detect high and low bandwidth wavelengths, also include the concept that such bands of

wavelengths overlap. Tokuda et al. specifically requires that detectors have the ability to distinguish between different frequencies. Overlapping wavelengths implicitly destroys any ability to distinguish. Thus, the references are not properly combinable with respect to claim 8 both because it would destroy the stated purpose of the reference, and there is no likelihood of success in making the combination.

Claim 12 is believed to distinguish the references at least for the same reasons as independent claim 10.

*4) Discussion of the Rejection of the Claims Under 35 U.S.C. § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397).*

**Claims 10, 11, 13-17, 19, 23 and 24**

Claims 10, 11, 13-17, 19, 23 and 24 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397). This rejection is respectfully traversed.

Claims 10 and 24, in addition to distinguishing the references based on using separate detectors to detect high and low bandwidth wavelengths, also include the concept that such bands of wavelengths overlap. Tokuda et al. specifically requires that detectors have the ability to distinguish between different frequencies. Overlapping wavelengths implicitly destroys any ability to distinguish. Thus, the references are not properly combinable with respect to claims 10 and 24 both because it would destroy the stated purpose of the reference, and there is no likelihood of success in making the combination.

Claims 14 and 15 describe a third substrate in which the charge detectors are formed, wherein the third substrate comprises further circuitry associated with the charge detectors. The Office Action states that "It would be obvious to include the charge detector on another substrate since it is an electronic device and not an optical device and the use of circuitry to operate the device would also be obvious." This is an unsupported statement, and it is requested that a

reference be provided. A proper prima facie case of obviousness has not been established, and the rejection should be reversed.

***5) Discussion of the Rejection of the Claims Under 35 U.S.C. § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397) and Yokoi (U.S. Patent No. 6,459,484) and further in view of Hier et al. (U.S. Patent No. 6,407,439) and Koslowski et al. (U.S. Patent No. 6,483,116).***

**Claims 20-22**

Claims 20-22 were rejected under 35 USC § 103(a) as being unpatentable over Cole et al. (U.S. Patent No. 5,550,373) in view of Tokuda et al. (U.S. Patent No. 5,144,397) and Yokoi (U.S. Patent No. 6,459,484) and further in view of Hier et al. (U.S. Patent No. 6,407,439) and Koslowski et al. (U.S. Patent No. 6,483,116). This rejection is respectfully traversed.

Claim 20 recites that the detectors are respectively formed of $Al_xGa_{1-x}N$ and $Al_yGa_{1-y}N$ where $y<x$. In addition to not disclosing the structure of independent claim 1, from which claim 5 depends, the references do not teach or suggest the claimed relationships between fractions of each element. A prima facie case of obviousness has not been established, and the rejection should be reversed.

Claims 21-22, in addition to distinguishing the references based on using separate detectors to detect high and low bandwidth wavelengths, also include the concept that such bands of wavelengths overlap. Tokuda et al. specifically requires that detectors have the ability to distinguish between different frequencies. Overlapping wavelengths implicitly destroys any ability to distinguish. Thus, the references are not properly combinable with respect to claim 8 both because it would destroy the stated purpose of the reference, and there is no likelihood of success in making the combination.

## 8. SUMMARY

Applicant believes the claims are in condition for allowance and requests withdrawal of the rejections to claims 1-17 and 19-24. Reversal of the Examiner's rejections of claims 1-17 and 19-24 in this appeal is respectfully requested.

Respectfully submitted,

BARRETT E. COLE et al.

By their Representatives,

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Date 7-25-2005 By

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Reg. No. 30,837

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Appeal Brief, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 25th day of July, 2005.

Dawn M. Poole
Name

Signature

## APPENDIX I

The Claims on Appeal

1. (Previously Presented) An optical sensor comprising:

a bandpass filter;

a first detector responsive to a low wavelength band passed by the bandpass filter; and

a second detector responsive to a high wavelength band passed by the bandpass filter, wherein the low band and high band are adjacent bands of wavelengths, wherein the combined low band and high band are wider than can be detected by either the first or second detector.

2. (Original) The optical sensor of claim 1 wherein the detectors are formed in a stacked relationship.

3. (Original) The optical sensor of claim 1 wherein the bandpass filter comprises an adjustable band pass filter.

4. (Original) The optical sensor of claim 1 wherein the bandpass filter comprises a Fabry-Perot etalon.

5. (Original) The optical sensor of claim 1 wherein the detectors are respectively formed of $Al_xGa_{1-x}N$ and $Al_yGa_{1-y}N$ where $y<x$.

6. (Original) The optical sensor of claim 1 wherein the detectors are respectively formed of $Al_xGa_{1-x}N$ and InGaN.

7. (Original) The optical sensor of claim 1 wherein the first detector absorbs wavelengths of approximately 250 to 300 nanometers.

8. (Original) The optical sensor of claim 1 wherein the second detector absorbs wavelengths of approximately 290 to 390 nanometers.

9. (Original) The optical sensor of claim 1 wherein the detectors are formed on a sapphire substrate.

10. (Previously Presented) An optical sensor comprising:

a bandpass filter;

an in-band source that illuminates a sample proximate the bandpass filter;

a first detector responsive to a low wavelength band passed by the bandpass filter; and

a second detector responsive to a high wavelength band passed by the bandpass filter wherein the wavelength bands are adjacent and overlapping, wherein the combined low band and high band are wider than can be detected by either the first or second detector.

11. (Original) The optical sensor of claim 10 wherein the in-band source is selected from the group consisting of laser, light emitting diode, ultraviolet source, and superluminescent diode.

12. (Original) The optical sensor of claim 10 wherein the detectors are formed on a sapphire substrate, and luminance from the sample passes through the sapphire substrate prior to being absorbed by the detectors.

13. (Original) The optical sensor of claim 10 and further comprising charge detectors coupled to the detectors.

14. (Original) The optical sensor of claim 13 and further comprising:

a first substrate;

a second substrate; and

a third substrate in which the charge detectors are formed.

15. (Original) The optical sensor of claim 14 wherein the third substrate comprises further circuitry associated with the charge detectors.

16. (Original) The optical sensor of claim 10 and further comprising:

a first substrate having the bandpass filter formed thereon;

a second substrate having the first and second detectors formed thereon.

17. (Previously Presented) The optical sensor of claim 16 wherein the first and second substrates are positioned such that first substrate is positioned between a biosample and the second substrate.

18. (Original) The optical sensor of claim 17 wherein the first and second substrates are coupled to each other by bump bonds.

19. (Original) The optical sensor of claim 10 wherein the bandpass filter comprises a Fabry-Perot etalon.

20. (Original) The optical sensor of claim 10 wherein the detectors are respectively formed of $Al_xGa_{1-x}N$ and $Al_yGa_{1-y}N$ where $y<x$.

21. (Original) The optical sensor of claim 10 wherein the detectors are respectively formed of $Al_xGa_{1-x}N$ and InGaN.

22. (Original) The optical sensor of claim 10 wherein the first detector absorbs wavelengths of approximately 250 to 300 nanometers and the second detector absorbs wavelengths of approximately 290 to 390 nanometers.

23. (Original) The optical sensor of claim 10 wherein the sample is inorganic, or a biosample.

24. (Previously Presented) An optical sensor comprising:

a bandpass filter supported on a glass substrate;

a first detector formed on a sapphire substrate responsive to a low wavelength band passed by the bandpass filter; and

a second detector formed on the first detector responsive to a high wavelength band passed by the bandpass filter, wherein the low wavelength band overlaps the high wavelength band, wherein the combined low band and high band are wider than can be detected by either the first or second detector.

25. (Withdrawn) The optical sensor of claim 24 and further comprising a laser for illuminating a biosample proximate the glass substrate.

26. (Withdrawn) The optical sensor of claim 25 wherein the bandpass filter is positioned between the glass substrate and the sapphire substrate and wherein biofluorescence from the biosample travels through both the glass substrate and the sapphire substrate to reach the first detector.

27. (Withdrawn) The optical sensor of claim 26 wherein the biofluorescence also travels through the first detector to reach the second detector.

28. (Withdrawn) A method of detecting biosamples, the method comprising:

illuminating the biosample to cause fluorescence of the biosample;

filtering the fluorescence to pass a band of desired wavelengths;

detecting the passed wavelengths with a first detector having a low wavelength adsorption capability; and

detecting the passed wavelengths with a second detector having a high wavelength adsorption capability.

29. (Withdrawn) The method of claim 28 and further comprising detecting charges on both the first and second detectors.

30. (Withdrawn) The method of claim 29 and further comprising determining a signature of the biosample from the detected charges and comparing the signature to known signatures of biosamples.

31. (Withdrawn) The method of claim 28 wherein the first detector absorbs wavelengths of approximately 250 to 300 nanometers and the second detector absorbs wavelengths of approximately 290 to 390 nanometers.

32. (Withdrawn) An optical sensor comprising:

a bandpass filter;

an array of pixels, each pixel comprising;

a first detector responsive to a low wavelength passed by the bandpass filter; and

a second detector responsive to a high wavelength passed by the bandpass filter.

33. (Withdrawn) The optical sensor of claim 32 wherein the pixels are arranged in a two dimensional array.

34. (Withdrawn) The optical sensor of claim 32 wherein the pixels are arranged in a linear array.

35. (Withdrawn) The optical sensor of claim 32 wherein the detectors are formed in a stacked relationship.

36. (Withdrawn) The optical sensor of claim 32 wherein detectors of different pixels are responsive to different wavelengths.

37. (Withdrawn) The optical sensor of claim 32 wherein the first detector in each pixel is responsive to the same wavelengths, and the second detector in each pixel is responsive to the same wavelengths different than the wavelengths of the first detector.

38. (Withdrawn) The optical sensor of claim 32 wherein the bandpass filter comprises an adjustable band pass filter.

39. (Withdrawn) The optical sensor of claim 32 wherein the bandpass filter comprises a Fabry-Perot etalon.

40. (Withdrawn) The optical sensor of claim 32 wherein the detectors are respectively formed of $Al_xGa_{1-x}N$ and $Al_yGa_{1-y}N$ where $y<x$.

41. (Withdrawn) The optical sensor of claim 32 wherein the detectors are respectively formed of $Al_xGa_{1-x}N$ and InGaN.

42. (Previously Presented) An optical sensor comprising:

a bandpass filter;

an in-band source that illuminates a sample proximate the bandpass filter;

a first detector responsive to a low wavelength passed by the bandpass filter;

a second detector responsive to a high wavelength passed by the bandpass filter;

a first substrate having the bandpass filter formed thereon;

a second substrate having the first and second detectors formed thereon, wherein the first and second substrates are positioned such that first substrate is positioned between a biosample and the second substrate, and wherein the first and second substrates are coupled to each other by bump bonds.

43. (Cancelled)